Patent claims

1. A honeycomb body (13) formed from alternating layers (10) that are essentially smooth and layers (1) that are at least partially structured, in particular catalyst supports and/or filters, preferably for the exhaust system of an automobile, the layers (1, 10) forming cavities (12) that allow a fluid to permeate essentially in an axial direction of flow (19), the structured layers (1) having structural extremities (4, 5) which are in contact with essentially smooth neighboring layers (10), and the structured layers (1) having in the region of their structural extremities (4, 5) inverted sections (2) which protrude into the cavities (12) and have a form that is approximately the inverse of that of the structural extremities (4, 5) in a cross section through the honeycomb body (13) that runs perpendicularly to the direction of flow (19), so that interruptions (22) are produced in the structural extremities (4, 5) in the region of the inverted sections (2), characterized in that counter-structures (11) are formed in the essentially smooth layers (10) in the region of the inverted sections (2) and/or the structural extremities (4, 5) and engage with the structural extremities (4, 5) and/or with the inverted sections (2).

2. The honeycomb body (13) as claimed in claim 1, characterized in that the counter-structures (11) are in contact with at least some of the structural extremities (4, 5) and/or inverted sections (2), with a positive fit.

3. The honeycomb body (13) as claimed in claim 1 or 2, characterized in that the counter-structures are formed in the essentially smooth layers (10) in

such a way that the flexibility of these layers (10) remains sufficiently great for winding, in particular by means of holes and/or interruptions in the counter-structures (11).

4. The honeycomb body (13) as claimed in claim 3, characterized in that the honeycomb body (13) is formed by
   a) winding at least one layer (1) or
   b) stacking a plurality of layers (1, 10) to form at least one stack and twisting at least one stack.

5. The honeycomb body (13) as claimed in one of the preceding claims, in which the inverted sections (2) are formed in layers (1) that are at least partially structured with a structure height (H), characterized in that the height (h) of the inverted sections (2) is less than or equal to the structure height (H).

6. The honeycomb body (13) as claimed in one of claims 1 to 4, in which inverted sections (2) are formed in layers (1) that are at least partially structured with a structure height (H), characterized in that the height (h) of the inverted sections (2) is greater than the structure height (H).

7. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that the counter-structure (11) is an elevation or depression, the height (a) of which is smaller, with preference much smaller, than the height (h) of the inverted sections (2).

8. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that every

inverted section (2) is in engagement with a counter-structure (11).

9. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the counter-structures (11) comprise inverted sections (2).

10. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the counter-structures (11) comprise embossings.

11. The honeycomb body (13) as claimed in claim 10, characterized in that the embossings are formed as microstructures which run essentially transversally to the axial direction of flow (19) of the honeycomb body (13).

12. The honeycomb body (13) as claimed in claim 10 or 11, characterized in that at least some of the counter-structures (11) comprise at least two embossings spaced apart in the direction of flow.

13. The honeycomb body (13) as claimed in one of claims 10 to 12, characterized in that the embossings have perforations, with preference microperforations.

14. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the counter-structures (11) are formed as holes (23).

15. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the counter-structures (11) are formed in the essentially smooth layers (10) as holes (23), into which the structural extremities (4, 5) and/or

the inverted sections (2) protrude, in particular essentially with a positive fit.

16. The honeycomb body (13) as claimed in one of claims 3 to 15, characterized in that at least some of the counter-structures (11) are formed in the layers (1) that are at least partially structured.

17. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that the quotient of
    a) the sum of the height (h) of the inverted section (2) and the height (a) of the counter-structure (11) and
    b) the radial distance (KH) between two walls of the cavities (1, 10)
    is less than 1.

18. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the layers (1, 10) are metallic layers.

19. The honeycomb body (13) as claimed in claim 18, characterized in that at least some of the metallic layers (1, 10) are sheet-metal layers.

20. The honeycomb body (13) as claimed in claim 19, characterized in that the sheet-metal layers (1, 10) have a thickness of less than 60 µm, with preference less than 40 µm, with particular preference less than 25 µm.

21. The honeycomb body (13) as claimed in one of claims 18 to 20, characterized in that at least some of the metallic layers (1, 10) at least partially allow a fluid to flow through.

22. The honeycomb body (13) as claimed in claim 21, characterized in that at least some of the metallic layers (1, 10) that at least partially allow a fluid to flow through are formed from a metallic fiber material, in particular a sintered metallic fiber material.

23. The honeycomb body (13) as claimed in one of the preceding claims, characterized in that at least some of the layers (1, 10) are configured from a composite material, with preference a composite material consisting of ceramic and metallic fibers.